

SUPPORT DOCUMENT  
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for the Air Operating Permit No. WA 000092-2 issued to

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DEPARTMENT OF ECOLOGY  
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## INTRODUCTION

This Operating Permit Support Document fulfills the operating permit rule "Statement of Basis" requirement and explains particular portions of the air operating permit (AOP) for the Port Townsend Paper Corporation mill (PTPC). The initial AOP was issued to PTPC on November 11, 2000 and expired on November 14, 2005.

This Support Document corresponds to the first renewal of the Title V permit issued to PTPC. As a renewal, new regulatory limitations which became effective subsequent to the first Title V issuance date have been incorporated. The regulatory citation for these new requirements is set forth throughout the permit under the column titled "Applicable Requirement". The reader is referred to the regulation cited if seeking more specific information about a particular limitation.

The proposed renewal permit is largely the same as the initial permit in structure and content. Where variation does occur, it is attributed to what would constitute administrative changes intended to correct errors, incorporate new limitations, acknowledge completed activities or present information in a clear and more concise manner.

This document is not part of the operating permit for the PTPC mill. Nothing in this document is enforceable against the permittee, unless otherwise made enforceable by permit or order.

### Highlights of PTPC's 2005-2009 Permit Renewal:

The current permit renewal effort has focused on clarifying the basis of authority for the applicable requirement. This currently means that some of the underlying orders are being modified. The basis of authority for monitoring and reporting is being transferred to WAC 173-401-615 from the former orders where this transfer makes sense. No change to the monitoring or reporting requirement itself is taking place. This simplifies the outstanding orders. The reason the monitoring and reporting had initially been established in orders was because the orders predated the Title V Program.

Ecology is implementing EPA's 40 CFR Part 64 Compliance Assurance Monitoring (CAM) regulation in this 2005-2009 permit renewal effort. CAM applies to a "pollutant-specific emissions unit" per 40 CFR Part 64.2(a). A unit is exempt from CAM per 40 CFR Part 64.2(b)(vi) if a Title V permit specifies a, "continuous compliance determination method as defined in Sec. 64.1. Continuous compliance determination is defined in Sec 64.1 as follows: "continuous compliance determination method means a method, specified by the applicable standard or an applicable permit condition, which: (1) Is used to determine compliance with an emission limitation or standard on a continuous basis, consistent with the averaging period established for the emission limitation or standard; and (2) Provides data either in units of the standard or correlated directly with the compliance limit."

The permit writer considers the "gap filling" requirement of WAC 173-401-615 (1)(b), as implemented where necessary throughout this permit, to be equivalent to the continuous

compliance determination required for exemption from CAM. As such, the pollutant-specific emissions units addressed in this permit are considered exempt from CAM implementation within the permit itself. CAM applicability consideration is initially necessary for specific emission units but once an exempt status is determined no further reference to CAM is made. This last train of reasoning is presented because the argument was made that units exempt from CAM implementation for reasons previously set forth still trigger CAM applicability.

## STATEMENT OF BASIS

When the Department of Ecology issues a draft operating permit, it is required to provide a statement that sets forth the legal and factual basis for the draft permit conditions, including references to the applicable statutory or regulatory provisions. [WAC 173-401-700(8)]

Copies of the state Regulatory Orders and Prevention of Significant Deterioration (PSD) Permits that impose limitations and requirements on the permittee are listed in Appendix C of the permit. The Orders/Permits establish source-specific limitations. The Orders/Permits are not intended to be a separate legal source for default limitations that are based in state and federal regulations.

### I. Assuring Compliance With All Applicable Federal Requirements

Ecology has preferentially relied on direct source testing as the most robust and accurate method of determining compliance and, through frequency of testing, assuring compliance. Source testing is resource and time intensive. More frequent monitoring requires the use of some sort of indirect surrogate parameter. The frequency of direct source testing has been stipulated through Orders/Permits. Ecology has attempted to reconcile frequency of monitoring with accuracy of monitoring by relying on both direct periodic source testing and more frequent indirect monitoring using surrogate parameters. Acknowledging the surrogate monitoring parameters as compliance indicators but not necessarily compliance determinants addresses the qualitative concerns regarding surrogate monitoring parameters. Where surrogate monitoring parameters have been employed, the Permit has been structured such that noncompliance with the surrogate limitation requires corrective action. Failure to take corrective action and bring the surrogate parameter within bounds constitutes noncompliance with the need to follow good operation and maintenance as required by WAC 173-405-040(10). The Permit thus combines periodic direct source testing which definitively determines compliance with surrogate monitoring requirements indicating compliance to achieve an overall monitoring program intended to meet the Title V requirement of monitoring sufficient to assure compliance.

The frequency of both direct source testing and the application of surrogate parameters intended to indirectly infer compliance with the underlying applicable requirement is based on best professional judgment of the historical probability of exceeding the imposed limitation and the potential magnitude of an exceedence.

## **A. Recovery furnace - federally enforceable limits**

Particulate limit compliance is monitored in two ways. A monthly source test using modified method 5 is required (A.2a). The modification, designed to reduce time invested for source testing, allows for one test run of at least an hour rather than three test runs of at least one hour. Provision for frequency reduction to quarterly is made if emissions are <75% of the limit for six consecutive months. Less frequent source testing is allowed only as long as source tests continue to demonstrate emissions are <75% of the limit (footnote 2). Between source tests, opacity will serve as a compliance indicator. Corrective action is required when opacity excursions occur (A.4). Table 1 shows opacity and particulate data for source tests from 10/97 through 9/98.

Opacity limit compliance is continuously monitored with a COM (A.3). Additionally, visual tests using EPA Method 9 can be run.

SO<sub>2</sub> limit compliance is monitored monthly with a modified Method 6 source test (A.6a). The modification, designed to reduce time invested for source testing, allows for one test run of at least an hour rather than three test runs of at least one hour. Provision for frequency reduction to quarterly is made if emissions are <75% of the limit for six consecutive months. Less frequent source testing is allowed only as long as source tests continue to demonstrate emissions are <75% of the limit (footnote 2). Table 1 includes SO<sub>2</sub> data for source tests from 10/97 through 9/98. The low concentration of SO<sub>2</sub> compared to the limit (all test results <40% of the limit during the time period), along with the composition of the black liquor being burned adequately assures compliance between source tests.

Table 1 - Recovery Furnace Data

Month	Particulates (gr/dscf @ 8% O <sub>2</sub> )	Opacity (%)	SO <sub>2</sub> (ppm)
Limit	0.08	35	200
10/97	0.030	11	17.5
11/97	0.010	13	2.7
12/97	0.012	12	11.2
1/98	0.007	13	0.4
2/98	0.009	8	0.9
3/98	0.022	13	1.3
4/98	0.015	8	0.9
5/98	0.004	-	35.1
6/98	0.006	5	13.9
7/98	0.007	7	0.4
8/98	0.006	5	76.9
2/01	.006	5	122
6/01	.004	1	142
8/01	.012	3	2
12/01	.008	12	131
2/02	.02	10	162
6/02	.01	3	56
7/02	.01	4	5
10/02	.01	6	104
3/03	.03	13	1.4
4/03	.036	19	28
9/03	.014	9	0
11/03	.01	12	9
3/04	.02	3	94

A lower state limit on the recovery furnace is not federally enforceable. The lower limit was originally issued under authority of WAC 173-400-131 which is not part of the federally approved SIP. WAC 173-400-131 addresses emission reduction credits.

### B. Smelt Dissolver Tank - federally enforceable limits

This permit iteration incorporates MACT requirements which establishes HAP limitations using PM as a HAP surrogate. Where wet scrubbers are used to control PM emissions, MACT requires monitoring of scrubber flow and scrubber pressure drop. Scrubber flow is now used as the surrogate monitoring parameter for all the PM limitations. A monthly source test using modified method 5 is still required (B.2) but opacity for B.2 is no longer used as the surrogate monitoring parameter. The RM 5 modification, designed to reduce time invested for source testing, allows for one test run of at least an hour rather than three test runs of at least one hour.

Provision for frequency reduction to quarterly is made if emissions are <75% of the limit for six consecutive months. Less frequent source testing is allowed only as long as source tests continue to demonstrate emissions are <75% of the limit (footnote 2). Between source tests, scrubber flow will serve as a compliance indicator. Corrective action is required when scrubber shower flow rate falls below a set level (B.3). Table 2 shows particulate data for source tests from 10/97 through 9/98 with the scrubber shower flow rate meeting the permit requirement. Table 2a shows PM data correlated with scrubber flow establishing the relationship between the two parameters and the adequacy of the scrubber flow minimum setpoint of 50 gpm.

Table 2 - Smelt Dissolver Tank Data

Test Date	Particulate (.3 bs/ton BLS limit)
10/97	0.178
11/97	0.141
12/97	0.164
1/98	0.211
2/98	0.155
3/98	0.211
4/98	0.231
5/98	0.236
6/98	0.176
7/98	0.269
8/98	0.151
9/98	0.247

Table 2a - Smelt Dissolver Tank Data after MACT performance testing.

Month	Particulates (.2 lbs/ton BLS limit)	Scrubber Flow Rate (gpm)
2/5/04	.11	82
2/6/04	.15	82
2/6/04	.22	70
2/6/04	.23	64
2/9/04	.20	75
2/9/04	.25	75
2/17/04	.18	80
2/17/04	.20	80
3/9/04	.18	83
4/1/04	.14	88

Condition B.1. Source emission testing was conducted by Port Townsend Paper Corporation on 9/10/04 to demonstrate compliance with 40 CFR Part 60 Subpart MM (NESHAPs). Source emission testing of particulate matter was conducted as a surrogate for hazardous air pollutant metals. This initial performance test (IPT) was intended to determine a setpoint for wet scrubber operation that, if maintained at or above the setpoint, would indicate ongoing compliance with the surrogate particulate limit. Results of the test are summarized below. The setpoint chosen was scrubber flow equal to or greater than 80 gpm averaged over 1 hour.

Time	Flow rate (dscf/min )	Firing rate (lb/hr BLS)	Solids conten t (%)	Dry solids rate (lb/hr)	Particulate (gr/dscf)	Particulate (lb/T BLS)	Scrubber Flow (gpm)
3:40-5:05 PM	7,482	131,286	71.4	93,738	0.109	0.15	89.3
5:33-6:59 PM	8,340	125,664	71.3	89,598	0.104	0.17	89.2
7:20-8:42 PM	8,340	123,891	70.4	87,219	0.108	0.18	89.2

Condition B.2. The surrogate compliance indicator for opacity is scrubber flow. During the 2000-2005 Title V permit term, the scrubber flow setpoint for corrective action was 50 gpm as an hourly average. MACT II for HAPs, using PM as a surrogate, is being implemented during the 2005-2009 permit term. MACT II required an initial performance test to determine what scrubber flow rate was appropriate to indicate ongoing HAPs compliance. The scrubber setpoint was determined to be 80 gpm as an hourly average. This is a higher scrubber flow than was previously set as an opacity compliance indicator. As such the previous permit term condition B.3 is no longer necessary and is not carried forward into the 2005-2009 permit term.

### C. Lime Kiln - federally enforceable limits

Particulate limit compliance is monitored in two ways. A monthly source test using modified method 5 is required (C.2). The modification, designed to reduce time invested for source testing, allows for one test run of at least an hour rather than three test runs of at least one hour. Provision for frequency reduction to quarterly is made if emissions are <75% of the limit for six consecutive months. Less frequent source testing is allowed only as long as source tests continue to demonstrate emissions are <75% of the limit (footnote 2). Between source tests, opacity will serve as a compliance indicator. Corrective action is required when venturi pressure drop falls below a set level (C.6). Table 3 shows particulate data for source tests from 10/97 through 9/98 with the scrubber pressure drop meeting the permit requirement.

This permit iteration incorporates MACT requirements which establishes HAP limitations using PM as a HAP surrogate. Where wet scrubbers are used to control PM emissions, MACT requires monitoring of scrubber flow and scrubber pressure drop. Scrubber flow is now used as



the surrogate monitoring parameter for all the PM limitations. Corrective action is required when scrubber shower flow rate falls below a set level (C.11). Table 3 shows particulate data for source tests from 10/97 through 9/98 with the scrubber shower flow rate meeting the permit requirement. Table 3a shows PM data correlated with scrubber flow and scrubber pressure, thus establishing the relationship between the parameters and the adequacy of both the 3-hour scrubber flow minimum average setpoint of 90 gpm and the 3-hour scrubber pressure drop average minimum of 8".

Condition C.4. Table 3a also summarizes SO<sub>2</sub> stack test history and allows a comparison to scrubber operation. The 2000-2005 permit required periodic SO<sub>2</sub> source testing. As indicated by the results below, scrubber performance is a reasonable indicator of SO<sub>2</sub> emissions which are well below the 500 ppm limit. Because of the continuous scrubber monitoring and the historic low nature of the SO<sub>2</sub> emissions, no ongoing discrete source testing for SO<sub>2</sub> is proposed for the 2005-2009 permit.

Table 3 - Lime Kiln Data

Month	Particulates (gr/dscf @ 10% O <sub>2</sub> )
Limit	0.13
10/97	0.042
11/97	0.028
12/97	0.035
1/98	0.021
2/98	0.030
3/98	0.030
4/98	0.019
5/98	0.043
6/98	0.025
7/98	0.024
8/98	0.036
9/98	0.056

Table 3a – Lime Kiln Data after MACT performance testing.

Month	Particulates (.13 gr/dscf limit)	Scrubber Flow Rate (gpm)	Scrubber Pressure Drop (" of H2O)	Opacity (%)	SO2 (ppm)
10/17/03	.036	734	28		
2/24/04	.035	550	28		
2/27/04	.020	438	28		
2/27/04	.021	433	20		
3/8/04	.028	616	28		
3/10/04	.031	377	11		
4/2/04	.056	216	8	12	
4/26/04	.045	712	18		
7/12/04	.034	95	4		
9/20/04	.085	427	12		
9/20/04	.046	426	11		
11/9/04	.03	668	26		
12/17/04	.063	53	9		
1/27/05	.026	1034	20		
6/9/05	.106	142	8.2	11	10.2

Opacity limit compliance is continuously monitored and indicated by maintaining the scrubber pressure drop greater than 8" H2O (C.3). Visual tests using EPA Method 9 can also be run.

TRS limit compliance with a New Source Performance Standards (NSPS) limit is continuously monitored with a CEM (C.5a). Although the lime kiln was built before the NSPS cut-off date, the NSPS limit applies because NCGs from units constructed after the NSPS cut-off date are burned in the lime kiln. Other lime kiln TRS limits are not federally enforceable because the applicable portions of the state regulations which serve as a basis for the limits are not part of the federally approved SIP (C.14a and C.14b).

#### **D. Power Boiler #10 - federally enforceable limits**

Particulate limit compliance is monitored in two ways. A monthly source test using modified method 5 is required (D.1). The modification, designed to reduce time invested for source testing, allows for one test run of at least an hour rather than three test runs of at least one hour. One year after permit issuance, provision for frequency reduction to quarterly is made if emissions are <75% of the limit for six consecutive months. Less frequent source testing is allowed only as long as source tests continue to demonstrate emissions are <75% of the limit (footnote 2). Between source tests, opacity will serve as a compliance indicator. Corrective action is required when scrubber parameters do not meet specified criteria (D.6). A one year study of source test data collected with the alternative opacity parameter limits in effect was

required to assure opacity serves as an adequate indicator of particulate compliance (D.6a). The results of this study are summarized below:

<u>Run</u>	<u>1</u>	<u>2</u>	<u>3</u>
Steam rate (klb/hr)	200	200	200
Scrubber air flow (cfm)	1325	1339	1356
Quench water flow (gpm)	101	101	102
Scrubber water flow (gpm)	103	103	102
PM (lb/mmBtu)	.11	.072	.085
PM (gr/dscf)	.048	.031	.034
Opacity			
1-minute avg maximum	18	10	9
6-minute avg maximum	13	8	7

Opacity limit compliance is continuously indicated by monitoring that the scrubber quench water flow, scrubber water flow, and air flow are adequate (D.2). Requiring both air and water flow monitoring is unusual, but necessary in this case due to the unique pollution control device used. The device requires water injection for particulate capture and air injection to assure proper liquid/particulate contact. The cited basis of authority for the alternate opacity monitoring parameters has been changed during this permit renewal. This is to accurately reflect the actual basis of authority which is the cited EPA letter of approval. The previous Title V permit cited Order 00AQIS-131 as the basis of authority. The Order just reflected what Ecology knew was forthcoming in the EPA letter. The monitoring program included in the permit is an EPA approved alternative monitoring program for NSPS compliance. Additionally, visual tests using EPA Method 9 can be run.

SO<sub>2</sub> limit compliance is continuously monitored by monitoring sulfur content of fuel (D.3). Only fuel with a sulfur content less than a set maximum is fired. The monitoring program included in the permit is Ecology approved. EPA has not yet approved a monitoring program. PTPC submitted their request for EPA approval on 2/27/98. The Ecology approved program will be modified as necessary to conform to the EPA approved program at such time when EPA approves a program (D.8). Calculations provided in Appendix A demonstrate that the NSPS SO<sub>2</sub> limit is most stringent and is met by meeting the fuel requirement.

NO<sub>x</sub> limit compliance is continuously monitored with a CEM (D.4).

### **E. Package Boiler - federally enforceable limits**

Particulate and particulates <10 microns in diameter limit compliance is monitored in two ways. A monthly source test using EPA method 5 is required. Because of the intermittent operation of the unit, a month is defined as 216 hours of operation in any one month or cumulative operation of 720 hours since the last monthly test (Facility-Wide General Requirement 22). The title 5 permit also includes calendar year annual mass PM and PM<sub>10</sub> limits as specified in the package boiler PSD permit.

Opacity limit compliance is continuously monitored with a COM (E.3). Additionally, visual tests using EPA Method 9 can be run.

SO<sub>2</sub> limit compliance is continuously monitored by monitoring sulfur content of fuel (E.4b). Only fuel with a sulfur content less than a set maximum is fired. The monitoring program included in the permit is as specified by NSPS requirements. PTPC submitted their request for EPA approval of an alternative monitoring program on 12/23/97. The permit provides for acceptance of an EPA approved alternative monitoring plan should EPA approve the PTPC request. A performance test requirement that has been satisfied is not included in the Title V permit.

NO<sub>x</sub> limit compliance is continuously monitored with a CEM (E.5).

Condition E.5a. The current NO<sub>x</sub> limit of .24 lb/mmBtu is derived per the algorithm detailed in PSD 96-01A condition 11. Condition 11 stipulated a reevaluation of the initial NO<sub>x</sub> limit set in PSD 96-01A condition 2. The reevaluation was based on actual emission history and resulted in the current NO<sub>x</sub> limit of .24 lb/mmBtu.

Fuel consumption limit compliance is continuously monitored with a fuel meter (E.6).

Fuel supply limit compliance is continuously monitored by analyzing each fuel shipment received (E.7). In accordance with reduced monitoring requirements specified in Order No. 97AQ-I030, the permit specifies calcium and copper monitoring of one fuel shipment per permit cycle rather than monitoring all fuel shipments.

CO and VOC limit compliance is continuously monitored with proper unit operation and maintenance (E.8 & E.9). The appropriate sections of the PTPC operation and maintenance program are included in the permit (appendix B).

#### **F. Power Boiler #2 - federally enforceable limits**

PB2 is no longer operational. Ecology was officially notified by PTPC on 10/1/2001. Work on disconnecting the oil supply line and removing the gas supply line to PB2 was completed on September 13, 2001.

#### **F. Digester, Multiple-effect Evaporator, Condensate Stripper System - federally enforceable limits**

TRS limit compliance is monitored by continuously monitoring lime kiln TRS emissions (F.1a). TRS emissions from units not covered by NSPS are not federally enforceable because the applicable portions of the state regulations are not part of the federally approved SIP. (F.2).

#### **H. Millwide Limits - federally enforceable limits**

Millwide limits compliance is demonstrated by calculations for daily and yearly emissions as required in the permit (G.1 - G.6). Data for those calculations comes from continuous monitoring, source tests, production rates, and emission factors.

Compliance with the particulate, VOC, and CO daily limits is demonstrated by compliance with the annual limits. Daily maximum emissions were estimated using annual emission and production data (Table 4). The daily maximum emission estimates are 47% or less of the daily limit. For particulate, VOC, and CO; demonstration of compliance with the annual limits serves as demonstration of compliance with the daily limits as long as annual emissions are less than 60% of the annual limit.

Table 4 - Millwide Emissions

	Annual emissions				Limit
	1996 (tons/yr)	1996 (% of limit)	1997 (tons/yr)	1997 (% of limit)	
Particulate	225	31	247	34	729
VOC	48	26	51	28	182
CO	1733	28	1797	29	6204

	Maximum daily emissions*				Limit
	1996 (lbs/day)	1996 (% of limit)	1997 (lbs/day)	1997 (% of limit)	
Particulate	1825	41	2111	47	4500
VOC	389	39	435	43	1010
CO	14053	41	15362	45	34500

	Kraft Production			
	1996 (tons/day)	1996 (% of max)	1997 (tons/day)	1997 (% of max)
Average	513	70	496	67
Maximum	728		742	

- maximum daily emissions are estimated using the ratio of maximum kraft production to average production multiplied by annual production in pounds per year and divided by 350 operating days per year.

## Facility-Wide General Requirement Condition 8

Permit Condition 8 is the generic opacity limitation from WAC 173-405-040(6) which applies to kraft mills. Permit Conditions 9 and 12 work together to assure compliance with Condition 8 by requiring, first, that facility equipment be maintained and operated “in a manner consistent with good air pollution control practice” and, second, that the permittee record and promptly respond to complaints received or possible noncompliance noticed by facility staff. Ecology believes that this is a practical and effective way to assure compliance because the emission units covered by this condition do not have control devices that can be monitored and they have very low risk of producing visible emissions except during process upsets. The mill is staffed around the clock and all staff are trained to notice and report unusual conditions, such as those associated with upsets. It is a violation of the permit to fail to take corrective action when an instance of possible noncompliance has been reported and found to be valid. Ecology believes that imposing additional monitoring such as a weekly visual inspection would have little value in identifying noncompliance and would, by presence, possibly convey a false sense of compliance.

### **Facility-Wide General Requirement Condition 10**

Permit Condition 10 is the generic SO<sub>2</sub> limitation from WAC 173-405-040(11) which applies to kraft mills. SO<sub>2</sub> emissions are a concern from combustion sources. At PTPC, combustion sources include power boilers 2 & 10, the package boiler, the recovery furnace, and the lime kiln. SO<sub>2</sub> emissions from each of these units are addressed in the appropriate subsection for each individual unit. Ecology has not imposed monitoring for units unlikely to have a reasonable potential of exceeding SO<sub>2</sub> emission limits.

Surrogate monitoring for intervals between direct SO<sub>2</sub> testing was not imposed because in practice mills do not adjust operating parameters to minimize SO<sub>2</sub> emissions. There are no control devices or control strategies to allow this. Instead, SO<sub>2</sub> emissions are largely a function of equipment and process design. Production based on a kraft process is optimized by system stability and continuity. Ecology has no professional basis to believe that process parameters fluctuate to a degree that results in SO<sub>2</sub> emissions approaching the 1000 ppm limit and thus warranting surrogate monitoring.

### **Facility-Wide General Requirement Condition 11**

Condition 11 has been discontinued in the Industrial Section Title V permits based on arguments raised by EPA. Specifically, former Condition 11 was interpreted to be too broad and inclusive of circumstances to which it was being improperly applied.

### **Facility-Wide General Requirement Condition 19 (formerly Condition 22)**

Because of the intermittent nature of package boiler unit operation and possible down time of other units, monthly and quarterly monitoring is further defined in this condition. The condition specifies when monitoring is required during periods when unit operation is less than continuous.

## **II. Insignificant Emission Units**

The facility-wide general requirements apply to the whole facility, including insignificant emission units and activities (IEUs), as required by the operating permit rule. The rule states, however, that IEUs are not subject to monitoring requirements unless the generally applicable requirements in the State Implementation Plan (SIP) impose them. [WAC 173-401-530(2)(c)]. The Washington SIP does not impose any specific monitoring-related requirements for the facility-wide requirements for IEUs at this source. The permit, therefore, does not require any testing, monitoring, reporting, or recordkeeping for insignificant emission units or activities.

### III. Regulatory Orders

The permittee is currently subject to several regulatory orders. Copies of the orders are provided in Appendix C of the Title 5 permit.

An important issue regarding any Title V permit is the basis of authority for the applicable requirements. This is particularly true regarding monitoring and reporting requirements. The basis of authority is used to determine federal or state-only applicability. Many of the applicable requirements come from orders issued by Ecology. With the permittee's agreement, the issue of state-only or federal applicability was put aside as it was agreed to rely entirely on WAC 173-401-615 as the basis of authority for the type and frequency of monitoring. WAC 173-401-615 requires monitoring and recordkeeping sufficient to assure compliance with the terms and conditions of the permit. This regulation is federally enforceable. Monitoring and recordkeeping requirements based on this regulation are federally enforceable. Some of the outstanding orders were also amended as part of the 2006 Title V renewal effort. The monitoring and reporting requirements were in large part removed from the orders and based on WAC 173-401-615. This results in the Title V Permit itself as the basis of authority. No change in the monitoring or reporting requirements themselves took place as a result of the transfer of basis of authority.

## APPENDIX A - CALCULATIONS

### Formulas

from 40CFR Part 60.45(e)(1)

$$E \left( \frac{lb}{mmBtu} \right) = C \left( \frac{lb}{dscf} \right) \times F \left( \frac{dscf}{mmBtu} \right) \times \left( \frac{20.9}{(20.9 - \% O_2)} \right)$$

$$C \left( \frac{lb}{dscf} \right) = \{conc \ (ppm) \times [(2.59 \times 10^{-9}) \times M \left( \frac{lb}{lb-mole} \right)] \left( \frac{lb}{dscf \cdot ppm} \right)\}$$

$$E \left( \frac{lb}{mmBtu} \right) = \{conc \ (ppm) \times \{ [(2.59 \times 10^{-9}) \times M \left( \frac{lb}{lb-mole} \right)] \left( \frac{lb}{dscf \cdot ppm} \right)\} \times F \left( \frac{dscf}{mmBtu} \right) \times \left( \frac{20.9}{(20.9 - \% O_2)} \right)\}$$

### F Factors

from 40 CFR, Part 60, App. A, Method 19

$F_d = 9600$  dscf/mmBtu for wood bark

$F_d = 9240$  dscf/mmBtu for wood

$F_d = 9190$  dscf/mmBtu for residual oil

### Power Boiler #10 - SO<sub>2</sub>

NSPS limit (0.8 lb/mmBtu) < WAC limit (1000 ppm @ 7% O<sub>2</sub>).

$$E \left( \frac{lb}{mmBtu} \right) = \{conc \ (ppm) \times \{ [(2.59 \times 10^{-9}) \times M \left( \frac{lb}{lb-mole} \right)] \left( \frac{lb}{dscf \cdot ppm} \right)\} \times F \left( \frac{dscf}{mmBtu} \right) \times \left( \frac{20.9}{(20.9 - \% O_2)} \right)\}$$

$$0.8 \left( \frac{lb}{mmBtu} \right) = \{conc \ (ppm) \times \{ [(2.59 \times 10^{-9}) \times 64 \left( \frac{lb}{lb-mole} \right)] \left( \frac{lb}{dscf \cdot ppm} \right)\} \times 9190 \left( \frac{dscf}{mmBtu} \right) \times \left( \frac{20.9}{(20.9 - 7)} \right)\}$$

$$conc \ (ppm) = 350 \ ppm \ @ \ 7\% \ O_2$$

$$so, [0.8 \left( \frac{lb}{mmBtu} \right) \cong 350 \ ppm \ @ \ 7\% \ O_2] < [1000 \ ppm \ @ \ 7\% \ O_2]$$

Note: the F factor for oil was used since the oil is the source of most of the S.



Compliance demonstration meeting 0.8 lb/mmBtu limit using fuel  $\leq 0.76\%$  sulfur by weight

$$\text{conc (ppm)} = \frac{0.0076 \left( \frac{\text{lb S}}{\text{lb oil}} \right) \times 2 \left( \frac{\text{lb SO}_2}{\text{lb S}} \right) \times \frac{385 \text{ dscf SO}_2}{64 \text{ lb SO}_2}}{0.0189 \left( \frac{\text{mmBtu}}{\text{lb oil}} \right) \times 9190 \left( \frac{\text{dscf}}{\text{mmBtu}} \right)} \times 10^6 \times \left( \frac{20.9 - 7}{20.9} \right) = 350 \text{ ppm @ } 7\% \text{ O}_2$$

so,  $[0.76\% \text{ S by weight} \cong 350 \text{ ppm @ } 7\% \text{ O}_2] = [350 \text{ ppm @ } 7\% \text{ O}_2 \cong 0.8 \text{ lb/mmBtu}]$

Note: assumes all S comes from the fuel and all S in the fuel becomes SO<sub>2</sub>.

Compliance demonstration meeting 1000 ppm @ 7% O<sub>2</sub> limit using fuel  $\leq 2\%$  sulfur by weight

$$\text{conc (ppm)} = \frac{0.02 \left( \frac{\text{lb S}}{\text{lb oil}} \right) \times 2 \left( \frac{\text{lb SO}_2}{\text{lb S}} \right) \times \frac{385 \text{ dscf SO}_2}{64 \text{ lb SO}_2}}{0.0178 \left( \frac{\text{mmBtu}}{\text{lb oil}} \right) \times 9190 \left( \frac{\text{dscf}}{\text{mmBtu}} \right)} \times 10^6 \times \left( \frac{20.9 - 7}{20.9} \right) = 980 \text{ ppm @ } 7\% \text{ O}_2$$

Note: assumes all S comes from the fuel and all S in the fuel becomes SO<sub>2</sub>.

### Lime Kiln - SO<sub>2</sub>

Compliance demonstration meeting 500 ppm @ 10% O<sub>2</sub> limit using fuel  $\leq 0.5\%$  sulfur by weight

$$\text{conc (ppm)} = \frac{0.005 \left( \frac{\text{lb S}}{\text{lb oil}} \right) \times 2 \left( \frac{\text{lb SO}_2}{\text{lb S}} \right) \times \frac{385 \text{ dscf SO}_2}{64 \text{ lb SO}_2}}{0.0189 \left( \frac{\text{mmBtu}}{\text{lb oil}} \right) \times 9190 \left( \frac{\text{dscf}}{\text{mmBtu}} \right)} \times 10^6 \times \left( \frac{20.9 - 10}{20.9} \right) = 180 \text{ ppm @ } 10\% \text{ O}_2$$

so,  $[0.5\% \text{ S by weight} \cong 180 \text{ ppm @ } 10\% \text{ O}_2] < [500 \text{ ppm @ } 10\% \text{ O}_2]$

Note: assumes all S comes from the fuel and all S in the fuel becomes SO<sub>2</sub>.